ESO #1019

Discussion Paper No. 3

Colloquium on Rural Finance
September 1-3, 1981
Economic Development Institute
World Bank
Washington, D.C. 20433 USA

INTEREST RATE POLICIES, AGRICULTURAL CREDIT AND INCOME DISTRIBUTION IN LATIN AMERICA

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Sponsored By

Economic Development Institute of
The World Bank
The Agency for International Development and
The Ohio State University

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Claudio Gonzalez-Vega *

Introduction

Two of the main characteristics of the agricultural credit markets in the Latin American countries are:

a. limited access to formal credit, and

b. a high degree of concentration of the loan portfolios of formal lenders.

That is, only a small proportion of the total number of producers in the rural areas of these countries receive loans from formal lenders and, among those with access to institutional loans, a very small group captures a very large share of the total amount of credit disbursed.

In effect, it has been estimated that, on the average, only about 15 percent of the agricultural producers in the Latin American countries have had access to formal credit and that, on the average, about 20 percent of the total number of borrowers have received over 80 percent of the total amount of credit disbursed (32, 73). This means that, about three percent of the total number of agricultural producers have been the beneficiaries of about 80 percent of the significant volumes of agricultural credit disbursed, during the last decades, by the formal lenders

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of the Latin American countries. Obviously, this has had a very significant impact on income distribution.

Limited access to institutional credit and a high concentration of loan portfolios characterize, not only agricultural credit programs but, in general, the evolution of the formal financial markets of these countries. Industrial credit and housing finance, among others, are similarly characterized. These features, however, seem to be particularly acute in the case of the agricultural sector. Although the arguments presented in this paper are, therefore, applicable to the financial system, as a whole, the illustrations included in it have been selected from rural credit programs in Latin America.

Circumstances associated both with the demand and the supply of credit explain this limited access and this high concentration of loan portfolios. Low average returns and high risks associated with agricultural activities induce a limited demand for agricultural credit (21, 54). High transactions costs, for both borrowers and lenders, further contribute to reduce the size of these markets and to restrict access to loans for many rural producers.

The concentration of loan portfolios reflects, in particular, the underlying concentration of wealth and political power in the rural areas of the Latin American countries. If there are a few wealthy producers, who own a significant share of the total assets of the community, it is not surprising that they also receive a significant portion of the volumes of credit disbursed. However, there is increasing evidence that the distribution of formal credit portfolios is usually more concentrated than the distribution of land, the distribution of the value of the agricultural product, or the distribution of income in the rural areas of the Latin American countries (8, 32, 57, 63, 70).

In effect, the concentration of credit portfolios is not a mere reflection of the underlying concentration of wealth. On the one hand, wealth and access to credit are related in both directions. Previous wealth is an important determinant of access to formal credit, while access to credit is, in turn, one of the main determinants of the growth of wealth through time, particularly in imperfect and fragmented capital markets. Differential access to credit, therefore, becomes not only a consequence, but also an important cause of the increasingly more concentrated distribution of wealth in the rural areas of Latin America.

On the other hand, wealth differences are not the only determinant of the high concentration of loan portfolios. Both borrower and lender behavior, as well as the policies which influence this behavior and the regulations which constrain it, are among its determinants. This paper claims that, in particular, the interest rate policies adopted by most of the Latin American countries have significantly accentuated the restrictions on access and the concentration of loan portfolios which arise from other circumstances. To demonstrate this proposition, the paper looks at the probable impact of interest rate restrictions on the behavior of formal lenders and surveys several explanations of lender behavior in an attempt to find clues for an examination of the modus operandi of the rationing processes which explain these phenomena.

Interest rates and income distribution

Because interest rates, as relative prices, affect several types of decisions, they impact income distribution in various ways. As the relative price of the future in terms of the present, interest rates influence savings and investment flows. In this respect, interest rates affect the intertemporal distribution of income, between present and future generations. As the price of financial assets, interest rates affect the composition of wealth portfolios and, thus, the distribution of income among asset holders. As a component of the costs of borrowing, interest rates affect the distribution of income between those with access and those without access to credit. As a price comparable to the rental price of capital, interest rates influence the choice of techniques and the selection of investment projects, according to factor intensities. In this respect, interest rates affect the functional distribution of income among factor owners (64).

This paper explores the impact of the interest rates charged on the loans of formal lenders, on the personal distribution of income; i.e., on the distribution of income among borrower and non-borrower individual producers and among borrower classes and among producer classes. For these purposes, agricultural producers may be classified into relevant classes, according to their size (large-small), wealth (rich-poor), the length of a banking relationship (old-new), the uncertainty associated with their productive activities (safe-risky), or according to any other criterion of socioeconomic, cultural or spacial location (urban-rural, literate-illiterate, close-distant, private-public, political friend-foe, etc.) Any of these classifications will be relevant for the analysis to the extent to which it represents a classification related to credit rationing behavior or is closely correlated to such classifications.

Interest rate policies

The interest rates charged on formal loans have been administratively set, or constrained by usury ceilings, in most of the Latin American countries. Even in the presence of high rates of inflation, these interest rates have been kept at low nominal levels. As a result, in real terms most of these rates have been negative, erratic and unpredictable.

Interest rates not only have been kept at levels which are too low in many respects, but also a differentiated structure of interest rates has been enforced (31). Usually, this has been an inverted structure. That is, it has not reflected the differential costs and risks associated with different borrower classes (30). Rather, it has reflected the desires of policy makers to favor some sectors or activities at the expense of others. However, the borrower classes usually favored with the preferential rates (e.g., small farmers) have frequently been the classes with respect to which formal lenders experience the highest expected risks and costs. As a result, formal lenders have been forced to charge the lowest rates precisely to those borrowers to which they would want to charge the highest interest rates. This paper claims that, as a result of these discrepancies, the borrower classes which the authorities have intended to favor have been actually harmed.

Moreover, several Latin American countries, which have undertaken interest rate reforms, have encountered unsormountable political obstacles to extend these reforms to their agricultural credit programs. As a consequence, while most other interest rates have been "liberated", or raised at significantly higher levels, the rates charged on agricultural loans and/or on small farmer loans have been kept at their originally low levels. This has significantly increased the differentials within the inverted structure described above, further augmenting the distortions, as well as accentuating their consequences on credit allocation and on the concentration of loan portfolios.

For example, in the mid 1970's, while the commercial interest rates and the Government bond rates reached 50 percent per annum and more in Brazil, the interest rates charged on agricultural loans were kept at 15 and 17 percent per annum (63). Substantial inefficiencies in credit allocation and inequities in income distribution resulted from this policy (1, 8, 57).

The interest rate subsidy

Two kinds of consequences on income distribution result when restrictions are imposed on the interest rates that formal lenders can charge on their loans:

a. a direct impact, due to the implicit subsidy, and

b. an indirect impact, due to the differential influence of the restrictions on access to credit.

When the interest rates at which credit is disbursed do not reflect the social opportunity cost of the resources transferred plus the social cost of transfering them, there is an implicit subsidy. This subsidy, per se, can have a significant impact on income distribution.

Suppose, conservatively, that the social costs of the loan amount to 10 percent per annum in real terms. If the nominal rate of interest charged is 15 percent per annum, but the rate of inflation is 55 percent per annum, then the real rate of interest charged is about 40 percent, and a rate of subsidy of 50 percent is implicit in this credit transaction. That is, 50 cents out of every dollar loaned represent an outright transfer of resources. If the total volume of credit disbursed represents 60 percent of the gross value of the domestic agricultural output, only in this sector, the total amount of the grant will be equivalent to 30 percent of the value of this output. This is a very sizable transfer of resources and its impact on income distribution is very significant.

Because the subsidy implicit in under-priced credit can be so substantial, it is not surprising that policy makers have considered it a powerful instrument for income redistribution. However, for reasons which are explained in this paper, the subsidy seldom reaches its intended beneficiaries. The vested interests of outspoken powerful groups, which eventually capture the subsidy, in turn originate the political difficulties to extend financial reforms to agricultural credit programs encountered everywhere.

This paper claims that credit, in general, and interest rate subsidies, in particular, are actually a very poor tool for income redistribution. The mechanism is inefficient, because the same redistributive objectives could be achieved at much lower social costs by other means. But even as a second best solution, this subsidy is not justified, because it is ineffective; i.e., because it is intrinsically incapable of achieving desired redistribution goals, and because, for empirically relevant circumstances, it is usually perverse; i.e., because it leads to a redistribution "in reverse", actually accentuating the concentration of income, instead of alleviating it. While the direct impact of the subsidy is regressive, its indirect impact further restricts access and concentrates loan portfolios.

To become a beneficiary of the interest rate subsidy, a producer must meet a precondition. He must first become a borrower from a formal lender. Access to formal credit, however, is very restrictive. As a consequence, a large proportion of the total number of producers are excluded, ad portas, from benefiting from this subsidy.

In addition, the amount of the grant is directly proportional to the size of the loan received. That is,

$$(1) \qquad G = [\, r^{*} - r \,]\, L(W)$$

where G: amount of the grant,
L: size of the loan,
W: borrower's wealth,
r^{*}: social opportunity cost of the resources, and
r: interest rate charged.

The larger the loan, the larger the grant. In addition, since there is a high correlation between previous wealth and size of loan received, the wealthier the borrower, the larger the grant. As a result, in the Latin American countries, large producers have had access to large loans and to the accompanying large grants. Medium-size producers have had access to small loans and to the associated small grants. Small producers have had no loans, no grants.

Moreover, when the rate of subsidy $[\, r^{*} - r \,]$ has increased, the large borrowers have had access to loans larger than before and the magnitude of their grants has increased more than proportionately. At the same time, small borrowers have found that their access to formal credit has become more difficult and that many of them have been excluded altogether from institutional portfolios (28). The precise nature of this indirect impact of the subsidy on access and thus on distribution will be examined in the following sections.

There is one more way in which subsidized credit has had an unfavorable impact on income distribution. The resources freely transferred have been collected through the exploitation of savers, who have not been paid the true value of their savings, and through the inflation tax. The distribution of borrowers has been much more concentrated than the distribution of holders of claims on the financial system with fixed nominal returns. As a result, the majority have paid a tax to finance a subsidy enjoyed by a few priviledged borrowers.

The impact of interest rate ceilings

The conventional analysis of the impact of interest rate ceilings posits a market for credit, characterized by an aggregate demand for credit, inversely related to the loan rate of interest, and an aggregate supply of deposits, directly related to the deposit rate of interest. If a ceiling is imposed on the loan rate charged, this model predicts that there will be a corresponding decline in the deposit rate. Less resources will then be mobilized through the financial system, and the total volume of lending will decline. At the ceiling loan rate of interest, however, there will be an excess demand for credit and, it is claimed, some non-price rationing mechanism will be required to clear the market. That is, the demands of all or some of the potential borrowers will be totally or partially frustrated.

It has been increasingly recognized that, in the case of agricultural credit at least, these rationing processes have an unfavorable impact on most producers, and that their negative impact is even more pronounced in the case of small farmers. This result has been intuitively linked to the higher risks and costs associated with lending to these small borrowers. The conventional model, however, cannot explain how these rationing processes actually clear the market. This paper attempts to explore the *modus operandi* of such rationing processes.

In particular, although the conventional analysis shows that depositors will clearly be worse off, as a consequence of the ceiling, it does not allow to determine if all borrowers, as a group, or if specific borrower classes, are better off. That is, the conventional model cannot explain how the new total amount of credit will be allocated among borrower classes. As a result, with this conventional model it is not possible to determine the behavior of the amounts of credit received by borrowers of different classes or to determine the extent to which the reduction in loan rates of interest compensates or not for a decline in the amount of credit received, when this is the case. As a result, the conventional model sheds little light on the impact of the ceiling on the allocation of resources and on the distribution of income.

In general, the imposition of a ceiling on interest rates has both aggregate and distributive effects on the portfolio of formal lenders. These effects include:

a. A reduction in the size of the total portfolio of assets of the lender. The reduction in the deposit interest rate paid, associated with the ceiling on the loan rate, reduces the lender's ability to attract savings deposits and to mobilize other resources The reduction in the lender's rate of profit, associated with the ceiling, reduces its ability to attract equity capital. These reductions in the lender's resources, in turn, reduce its ability to borrow, given prevailing leverage rules. The total volume of resources mobilized, therefore, declines on these three counts.

b. A reduction in the lender's loan portfolio, as different from other non-credit investments (e.g., Government bonds, real estate, etc.). The ceiling on the loan rate reduces the relative profitability of lending and, therefore, it reduces the proportion of the lender's total portfolio of assets devoted to loans.

c. A change in the composition of the loan portfolio. The ceiling alters the relative profitability of loans to alternative borrower classes and, given the rationing processes adopted by the lender, it leads to changes in the relative shares of the loan portfolio going to different borrower classes. These portfolio redistributions usually lead to a greater concentration of the amounts disbursed in favor of a smaller group of borrowers.

Rationing processes

Any loan has three aspects:

a. its size,

b. the interest rate charged, and

c. the non-interest terms of the loan contract, including requirements concerning collateral, borrower's equity or compensating balances, the maintenance of a stable customer relationship, the length of the loan period, the opportunity in which the loan is granted, the amortization schedule, etc. (38).

Lenders adjust all three of these aspects of the loan to each particular borrower. Given the risks and the transaction and information costs associated with different borrower classes, presumably lenders adjust these three aspects of any loan in an optimum manner.

When a ceiling on interest rates becomes binding, the lender loses one degree of freedom. It cannot adjust the loan by increasing the interest rate charged above the ceiling level. As a consequence, this adjustment requires either a change in the non-interest terms of the loan contract, or a reduction in loan size. As a consequence, the borrower receives a less attractive combination of these three aspects; i.e., a less attractive product, while the lender's profits decline. Pareto optimality is lost.

There are, therefore, three possible ways to clear a credit market:

a. through interest rates,

b. through changes in the non-interest terms of the loan contract, and

c. through changes in loan size.

The first two ways are both examples of rationing through price, as different from rationing through quantity. That is, the non-interest terms of the loan contract may be considered as elements of the price vector of the loan, in addition to interest rates. The third way to clear the market, however, is undoubtedly an example of non-price rationing (9).

Non-price rationing properly defined, therefore, is a situation where the borrower's demand for credit remains unfulfilled, even though he is willing to pay the ruling interest rate and is willing to cover all the other elements of the price vector of the loan. This is not the case when the lender restricts the non-interest terms of the loan. Thus, when the borrower is rationed out of the market via increases in the non-interest price of the loan, it is him who decides that the price is too high. In the event of non-price rationing, on the other hand, the potential borrower is willing to pay the full price, but the lender is not willing to grant him a loan of the size demanded. The difference between these two types of rationing, therefore, is that in the case of non-price rationing an unsatisfied excess demand for credit will prevail.

When a ceiling on loan rates of interest is imposed, both types of rationing will usually occur; i.e., rationing will take place both via changes in the non-interest terms of the loan and in loan size. Moreover, both types of rationing frequently lead to a greater concentration of credit portfolios and thus have an unfavorable impact on income distribution.

Non-price credit rationing: a survey

The conventional model does not make it possible to answer questions concerning the impact of interest rate restrictions on income distribution. For this, it is necessary to understand better the behavior of lenders, particularly in the presence of such restrictions. Several models of lender behavior have been constructed in recent years. Some of them have adapted the theory of the firm to explain this behavior, given alternative objective functions and market structures (11, 38, 51). Others have been constructed on the basis of portfolio theory (6, 39). Both approaches are useful for our analysis Because uncertainty and risk are important, portfolio theory provides fruitful insights. Because transaction costs as well as product heterogeneity and product differentiation are important, the theory of the multiproduct firm is particularly appropriate. In addition, it is possible to capture uncertainty and risk within the theory of the firm, by incorporating an *ex ante* premium for risk in the lender's cost functions.

Three theoretical developments have produced important results applicable to this analysis:

a. The adaptation to financial markets of the general theories about price controls and black markets. Fruitful theoretical developments and lots of empirical evidence have resulted, in particular, from the analysis of the impact of interest rate ceilings and other usury regulations on the markets of consumer credit and personal loans from finance companies, as well as in the markets for housing finance, in the United States of America (5, 11, 19, 33,34, 35, 36, 49, 51, 58, 59, 65, 67, 68).

b. The analysis of the determinants of interest rates in the informal credit markets of the low income countries, pioneered by A. Bottomley, as well as further attempts to measure the level of the components of transaction costs, risk, and monopoly profits in these markets (2, 13, 14, 15, 16, 17, 21, 28, 52, 53, 54, 63, 69, 72).

c. The theories about the practice of non-price credit rationing by lenders, particularly those associated with the controversy over the availability doctrine, initiated in the early 1950's. This approach, in particular, can provide important insights about the behavior of lenders in the presence of interest rate restrictions as well as about the *modus operandi* of the rationing processes adopted by them. (6, 9, 10, 20, 22, 23, 24, 28, 30, 37, 40, 41, 42, 43, 44, 45, 46, 47, 50, 56, 61, 62).

According to the availability doctrine, reductions in the money supply can have a significantly restrictive impact on spending, even if they induce only small increases in interest rates or if the interest-elasticity of the demand for investment is very low, because spending is basically constrained by the availability of credit. Credit, in turn, is partly allocated by lenders through non-price rationing mechanisms. When the money supply is restricted, credit is rationed more strictly and the reduced availability of credit influences spending.

In a statement to Congress in 1952, Paul Samuelson argued that non-price credit rationing is entirely inconsistent with profit-maximizing lender behavior (62). The theory of non-price credit rationing was subsequently developed in order to show that this behavior is rational and consistent with profit maximization. Although most of the contributions attempt to explain the existence of non-price credit rationing in the absence of ceilings and other interest rate restrictions, obviously such theoretical developments, as well as the empirical evidence on lender behavior gathered, are very useful in explaining the rationing processes adopted when such restrictions are imposed.

Risk and non-price rationing

Donald Hodgman was the first one to seriously attempt a general explanation of non-price credit rationing, consistent with rational behavior and which does not rely upon oligopolistic market structures or interest rate ceilings (40). He concentrated his efforts in showing that, due to the existence of default risk, any borrower will reach a loan size beyond which he will not be able to obtain additional funds by promissing to pay a higher interest rate.

That is, Hodgman showed that a lender's supply of credit to an individual borrower becomes totally inelastic at some rate of interest. The main reason is that the borrower's final wealth, and thus his ability to repay the loan, is finite. Chase, Miller, Ryder, and Freimer and Gordon provided additional refinements and corrections of Hodgman's model, to further take into account collateral, bankrupcy costs, variable-size investments in addition to fixed-size investments, etc., all of which significantly helped to better understand the nature of default risk (20, 23, 56, 61). Avio, in turn, considered these questions within the framework of portfolio analysis (6).

As Jaffee has pointed out, however, the existence of a loan supply function which implies that a borrower cannot obtain more credit than some finite maximum, regardless of what interest rate he is willing to pay, is not a sufficient proof of a prevailing practice of non-price credit rationing (44, 45). To demonstrate the existence of non-price credit rationing, as well as its consistency with rational behavior, one must show that an excess demand for credit persists at the interest rate charged under equilibrium conditions. This requires a discussion both of supply and demand.

Jaffee, therefore, explored whether it can be optimal for a lender to set the interest rate at a level where demand exceeds supply, and leave it there in spite of this excess demand. That is, strictly speaking, non-price credit rationing occurs when the lender is unwilling to extend the loan demanded by the borrower and supplies only a smaller amount, in order to maximize its profits. Jaffee set up a model of a lender which maximizes its expected profits taking into account possible borrower default on the loan. The lender's expected income from each loan was formulated as an explicit function of the parameters of the borrower's demand function, the probability of default, and the rate of interest charged on the loan. Within this framework, the proof of the rationality of rationing amounted to showing that the lender can increase its expected profits by rationing at least some customers.

With this model, Jaffee showed that credit rationing is not profitable for a lender acting as a discriminating monopolist, i.e., for a lender which maximizes its expected profits with respect to each borrower separately and is free to charge each borrower a different interest rate. However, if the lender is constrained to charge all borrowers the same rate although it can choose this rate freely, and can decide on the size of the loan to be granted to each borrower, then at the common optimal interest rate, for some borrowers the most profitable loan for the lender to supply may be less than the amount demanded. The same result is obtained if the lender sets up a number of borrower classes and charges only borrowers within each class the same rate.

Jaffee concentrated his efforts, therefore, in showing that, due to the existence of default risk and of constraints on the differentials among the interest rates that lenders can charge to different borrowers, non-price credit rationing is profitable. That is, if for some reason lenders engage in limited interest rate differentiation among borrowers, in the sense that they charge identical rates to nonidentical borrowers, at the common interest rate charged, the demand for credit of some borrowers will exceed the lender's optimum supply to them.

Jaffee considered that, aside from usury ceilings, the pressure of legal restrictions and considerations of good will and social mores would make it inadvisable if not impossible for a lender to charge widely different rates to different borrowers. Lenders would tend, instead, to limit the spread between the rates and to justify the remaining differentials in terms of a few objective and verifiable criteria such as industry class, asset size, and other standard financial measures. A classification scheme of this type is likely to be the result of tacit collusive agreements among oligopolistic lenders, too. The entire structure of interest rates, therefore, would tend to be compressed within narrower limits than would otherwise be optimal. The result is that widespread non-price rationing would occur.

The constraints on interest rate differentiation, in addition, may be the result also of the costs, especially information costs, of distinguishing between different borrowers and their risk characteristics, what in the more recent literature are known as "screening costs", as well as of the direct costs of a more complicated and detailed interest rate structure (46).

More recently, Keeton has distinguished between two types of non-price credit rationing (50). In one case, such rationing is said to occur whenever a borrower receives a smaller loan than he would desire at the interest rate charged by the lender. In the other case, the price of credit is defined as the complete set of loan terms confronting a class of borrowers with given characteristics and the demand for credit is defined as the total number of loans which members of the class would like to receive at those terms. In these circumstances, non-price rationing occurs whenever the total quantity of loans demanded by the class at those terms exceeds the total quantity supplied by the lenders.

Keeton showed that these two types of rationing may be observed in equilibrium situations, even in the absence of government-imposed constraints on interest rate and under conditions of perfect competition. It may occur in the first sense, if there is a risk of default which increases with the size of the loan. It may occur in the second sense, if there is a moral hazard problem resulting from the lender's inability to monitor all relevant characteristics of the borrower's investment project.

When a borrower enjoys limited liability, he will have an incentive to increase the riskiness of his investment project. Because a fixed amount is due at the end of the period, the borrower receives all the gains from exceptionally high outcomes,

but because he enjoys limited liability, he suffers none of the losses from exceptionally low outcomes. As a result, the borrower will benefit at the expense of the lender if he can alter the characteristics of his investment project in such a way as to increase the probability of both very low and very high outcomes. In fact, the borrower may well prefer a project with greater risk to one with higher expected outcomes.

In some cases the lender may find it possible to specify all relevant characteristics of the borrower's investment project in the loan contract and enforce such agreements by monitoring the borrower's behavior. However, if this cannot be done, the lender will want to take into account the effect that the terms of the loan have on the borrower's project choice. An increase in the interest rate on the loan may affect the borrower's project choice in the same way that an increase in insurance coverage will influence a policyholder's level of care in avoiding accident. Keeton showed that this moral hazard may perform essentially the same role as interest rate ceilings in inducing nonprice credit rationing. In addition, if there is some indivisibility which makes it impossible to reduce the loan size, the second type of rationing will take place.

The type of moral hazard examined by Keeton is in fact just an example of a broader class of imperfections which prevail in credit markets. When any one of these imperfections is present, an increase in the interest rate charged will have an adverse effect on the lender's expected returns, which in turn may outweight the favorable direct effect of the increase in this rate on the total amount due (7). One such imperfection arises from the fact that the lender may have to incur liquidation, collection and recovery costs if the outcome of the investment project financed is insufficient to repay the loan and the borrower is forced to default. As observed by Barro, an increase in the interest rate raises the probability of defaultand, therefore, it increases the expected value of these bankrupcy costs (10).

Another type of market imperfection arises when the outcome of the investment project depends both on some "state of nature" which is realized at a later date and on the amount of additional resources that the borrower is willing to contribute to the project after that state is realized but before the loan becomes due. Since the borrower receives only that part of the outcome which remains after repaying the loan, he will either contribute the same amount of new resources as if he received

the entire outcome and repay the loan in full, or he will contribute no new resources and default. Since the borrower will choose the latter course whenever the amount left over after paying back the loan would be less than the opportunity cost of the new resources, an increase in the interest rate will make it more likely that he will default. The analogy in this case is the insurance policyholder's incentive to order excessive repairs for damage if the accident occurs, because he pays only part of the cost.

Finally, Fried and Howitt have attempted to extend to credit markets some recent developments in the theory of labor contracts, which explain the closely analogous question of why firms lay workers off rather than adjust wages. Their answer is that credit rationing exists as part of an equilibrium risk-sharing arrangement between the lender and the borrowers. A borrower and lender can benefit not only from trading loan contracts now, but also from an "understanding" or "implicit contract" concerning the amounts they will be willing to trade, and at what prices, under various conditions in the future. By means of such arrangements lenders and borrowers can share the risks associated with an uncertain future. Thus their arrangements may be similar to insurance contracts in which the less risk-averse party agrees for a fee to bear some of the risks to which the other party would otherwise be exposed (24).

If loans were always negotiated in spot auction markets, borrowers would be exposed to the risk of fluctuating interest rates on their loans. A lender may be willing to insure the borrower against part of such risks by a policy of keeping interest rates less variable than they would be on spot auction markets, in return for which the borrowers may be willing to compensate the lender in the form of a higher average interest rate. By dampening the movements in interest rates, these arrangements open up the possibility of non-price credit rationing.

The relationships between borrowers and lenders are involved and highly personal. The object being traded is heterogeneous, since it involves the trustworthiness of the borrower, and on either side of the market there are nontrivial costs involved in switching one's trading partner. Normal arrangements between borrowers and lenders take into account the advantages to both sides of maintaining a continuos relationship. Fried and Howitt show that, if there were no costs of switching trading partners non-price credit rationing would not occur. Furthermore, this analysis explains the tendency of lenders to ration least heavily those customers with the longest standing relationship.

A model of lender behavior

The theories of non-price credit rationing surveyed above suggest types of lender behavior which can help to explain the rationing processes adopted by lenders in the presence of interest rate restrictions. Interest rate ceilings and the enforcement of inverted interest rate structures lead lenders to reduce loan sizes and to restrict the non-interest terms of loan contracts, according to the same classes of criteria predicted in these models. The nature of these criteria suggests that these rationing processes favor larger, safer and long-standing borrowers and harm smaller, riskier and newer borrowers. This, in turn, worsens income distribution. A very simple model of non-price credit rationing is developed here in order to illustrate how this differential impact of interest rate ceilings on access to credit can take place.

Assume that a lender is a profit maximizing firm and that its only source of revenues are the interest payments on the loans received. There are three components of this lender's costs:

a. the opportunity cost of the funds,

b. the costs of administration of the loans, and

c. the losses due to default.

Assume that the opportunity cost of the funds is given, independently of loan size, and that it is identical for all borrower classes. The costs of administration include the handling costs of the loan, incurred in recording and disbursing it and in receiving payments. These handling costs tend to be independent of the size and degree of riskiness of the loan. As a function of loan size, therefore, they can be treated as a fixed cost. The costs of administration also include the risk-reducing costs of the loan, directed at reducing the probability of default in the portfolio, through the adquisition of information and its use in selection decisions, as well as through supervision and collection efforts.

The risk-reducing costs are not independent of loan size or of the expected losses due to default. If more resources are spent in loan evaluation and supervision, the lender can reduce its losses due to default. The lender, however, cannot completely eliminate uncertainty about repayment. It must include among its *ex ante* costs, therefore, a premium for risk. The lender's costs functions are the result of all of these components.

Loan contracts have many dimensions: length of the period, type of collateral, size and area of activity of the borrower, etc. As a consequence, loans must be treated as non-homogeneous products. In particular, loans to different classes of borrowers must be treated as different products if the lender distinguishes between them and if it estimates different cost functions for each borrower class. The lending costs curves for some borrower classes will be higher than for other borrower classes. For example, usually the cost curves of lending to smaller producers will be higher than the cost curves of lending to larger producers. On the other hand, however, Gonzalez-Vega has shown that, for each borrower class, the marginal costs of lending increase as the size of the loan increases (28).

Different degrees of riskiness are one of the main criteria to separate borrowers into different classes. Obviously, it is in the interest of the lender to distinguish among as many borrower classes as possible, but this requires information that is costly to acquire and to process or that may not be available. The lender, therefore, sets up a limited number of classes and estimates a cost function for each class. Within each class, costs can be expressed as a function of loan size. If he is not prohibited to do so, the lender will charge different interest rates, for a loan of the same size, to borrowers of different classes, as well as different interest rates for loans of different sizes, within a given borrower class.

For a given class of borrowers, as a function of loan size the cost function of lending is:

$$C = dL + H + xL \tag{2}$$

where C: total cost of the loan,
L: loan size,
d: rate of opportunity cost of the funds (constant),
H: fixed handling costs of the loan, and
x: optimum combination of risk-reducing average costs and a premium for risk, resulting from the lender's effort to minimize their sum, for a given borrower class (28).

The lender's profit function is:

$$\pi = \sum^{n} R_i - \sum^{n} C_i \tag{3}$$

where $R_i = r_i L_i$

and R_i: revenues from a loan to the i-th borrower, or class,
r_i: interest rate charged to the i-th borrower, or class,

L_i : size of loan to the i-th borrower, or class,

C_i : cost of a loan to the i-th borrower, or class, and

π : the lender's total profits.

For a perfectly discriminating monopolist, profit maximization would require that loan size, for each borrower, that equates the marginal revenue and marginal cost of the loan to the lender. As Jaffee has shown, if the lender is constrained to charge a uniform rate to different borrowers, even if it can freely choose it, profit maximization may require non-price credit rationing (44). A similar result will be obtained, *a fortiori*, if a binding ceiling on interest rates is enforced.

Assume that a ceiling r^* is imposed on the rates of interest charged on all kinds of loans. Given the possibility of non-price rationing, the profit-maximizing loan sizes for different borrowers can be obtained as the solution of a programming problem, in which the demand functions are introduced as inequality constraints (22). If there is no rationing, loan size will equal the amount of credit demanded at the interest rate charged. If there is rationing, the inequality constraint will be binding, and an excess demand for credit will prevail at the interest rate charged.

The lender, therefore, is assumed to maximize:

$$(4) \qquad \pi = r^* \sum_{n} L_i - \sum_{n} C_i$$

subject to:

$$(5) \qquad L_i - D_i \leq 0$$

$$0 \leq L_i$$

where D_i : amount of credit demanded by the i-th borrower, and

r^* : interest rate ceiling, supposed binding.

The corresponding Lagrangean function is:

$$(6) \qquad K = r^* \sum_{n} L_i - \sum_{n} C_i - \sum_{n} \lambda_i (L_i - D_i)$$

The Kuhn-Tucker conditions for maximum profits are:

$$(7) \qquad \frac{\partial K}{\partial L_i} = r^* - \frac{\partial C_i}{\partial L_i} - \lambda_i \leq 0$$

$$(8) \qquad \sum^{n} \left(r^* - \frac{\partial C_i}{\partial L_i} - \lambda_i \right) L_i = 0$$

$$(9) \qquad \lambda_i \left(L_i - D_i \right) \leq 0$$

$$(10) \qquad L_i - D_i \leq 0$$

$$(11) \qquad 0 \leq L_i$$

$$(12) \qquad 0 \leq \lambda_i$$

When non-price credit rationing does not take place, the borrower receives the size of loan demanded. That is, $L_i = D_i$. From condition (9), this requires that λ_i be strictly positive. From condition (8), in turn, this implies that the interest rate charged must be higher than the marginal cost of the loan. On the other hand, non-price credit rationing implies that $L_i - D_i < 0$. In turn, this requires that $\lambda_i = 0$. Thus, when non-price credit rationing is taking place, the marginal cost of the loan is being equated to the ceiling interest rate r^*. Depending on the relative level of the ceiling with respect to marginal cost curves of lending, none, some or all of the borrowers may be subjected to non-price credit rationing by a profit maximizing lender.

On the iron law of interest rate restrictions

Non-price credit rationing is widely practiced by formal lenders in the Latin American countries. Several mechanisms and rules of thumb are employed to restrict the size of the loans approved for certain borrower classes. Frequently, the size of these loans is well below the amounts demanded at the subsidized interest rates charged.

Among the most popular devices for non-price credit rationing is the establishment of limits ("avios") on the amount of credit to be granted per hectare of land to be cultivated. These limits vary from crop to crop, presumably reflecting the different costs of production associated with different crops. Frequently, however, the proportion of total costs covered by these limits varies significantly from crop to crop. These differences tend to reflect the lender's perceptions about the risks and costs associated with loans for different crops. As a result, the proportion of total costs to be financed is usually higher in the case of the safer and more profitable commercial crops, usually for export, than in other cases (32).

The establishment of limits of credit per hectare to be cultivated has also been very vulnerable to political pressures from interested groups, particularly in the case of public lenders (71). As a result, the estimation of costs has been more liberal in the case of powerful borrowers. Since a substantial subsidy is implicit in under-priced credit, the higher the estimation of costs per hectare, the greater the subsidy to be received.

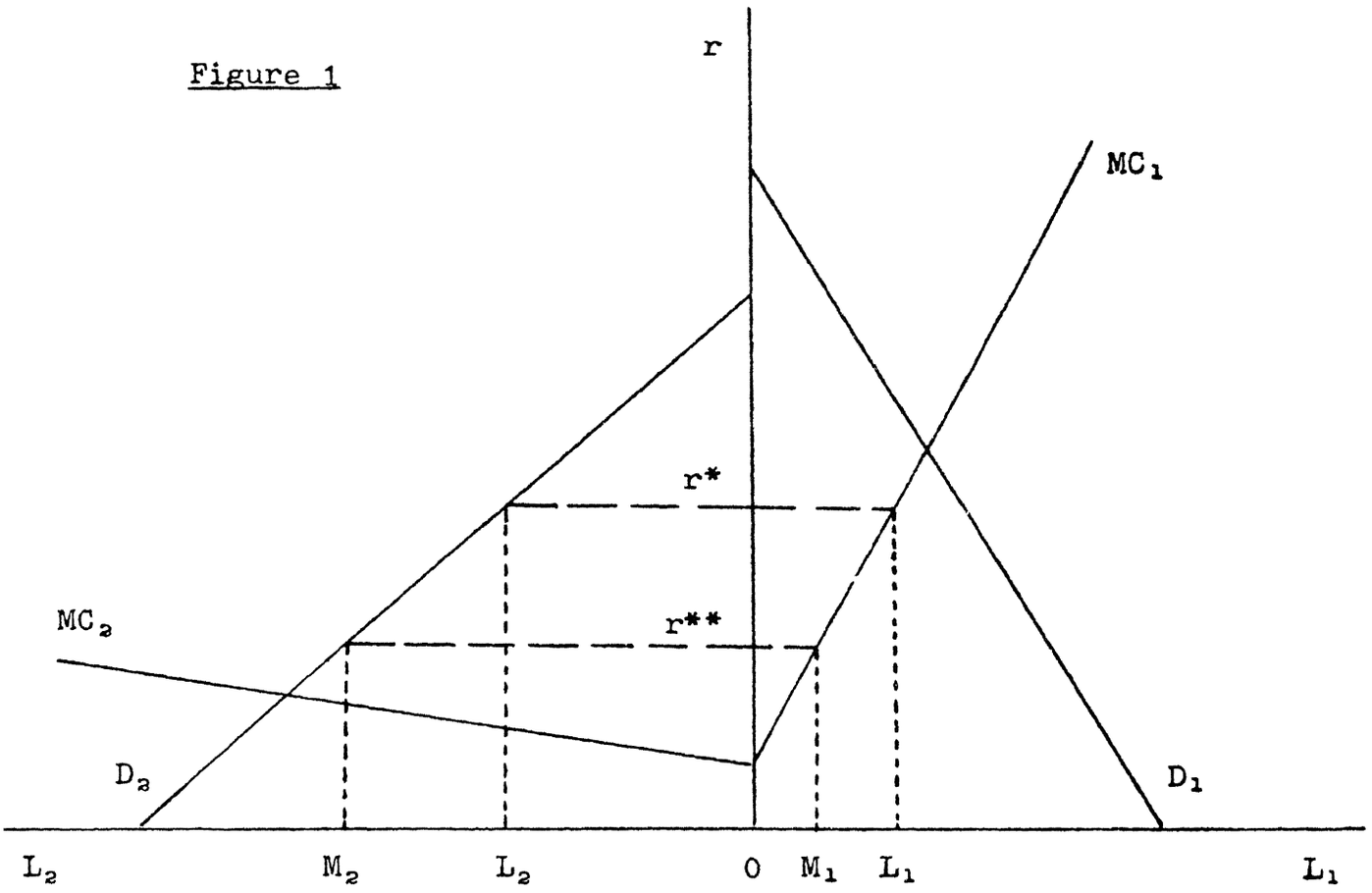
During inflationary periods, moreover, not all of these limits are corrected at the same pace. While the limits of credit to some borrower classes are frequently and fully adjusted, this is not the case for other borrower classes. As a consequence, some producers continue to receive the same, or even larger amounts of credit, in real terms, as the inflation proceeds, while other producers receive loans of a smaller size, in real terms, every time. The latter are then forced to seek additional loans in informal credit markets, in order to complement the institutional loans received, or to reduce their level of activity.

Given this behavior of lenders in Latin America, their loan portfolios usually include both "rationed" borrowers, in the sense described, and "non-rationed" borrowers. The latter are borrowers who receive all the credit that they demand at the interest rates charged. They are the equivalent of the "prime-rate" borrowers. The "rationed" borrowers, on the other hand, are granted loans that do not satisfy their demands for credit at the going interest rates. This situation is represented in Figure 1, for a two-borrower case.

At a given interest rate ceiling, r*, the "rationed" borrower, represented in the right-hand quadrant of Figure 1, receives a loan of size L_1, which equates the interest rate charged with the marginal cost of lending and which leaves him with an unsatisfied demand for credit. On the other hand, the "non-rationed" borrower, represented in the left-hand quadrant, receives a loan of size L_2, as he demands.

What Gonzalez-Vega has called the "iron law of interest rate restrictions" predicts that, if for some reason the interest rate ceiling becomes more restrictive, the size of the loans granted to "non-rationed" borrowers will increase, and the size of the loans granted to "rationed" borrowers will decline (28,29,30).

Figure 1



In effect, as the ceiling is lowered from r* to r**, the size of the loan granted to the "non-rationed" borrower increases from L_2 to M_2, as he demands a larger loan at the lower interest rate. At the same time, the size of the loan granted to the "rationed" borrower declines from L_1 to M_1, along the upward-sloped marginal cost curve of lending to him. These changes in loan size imply a redistribution of the lender's portfolio in favor of the "non-rationed" borrowers.

Since the "non-rationed" borrowers tend to be the large, wealthy, influential producers, who are already receiving the largest loans, this behavior of the lenders, in the presence of the interest rate restrictions, further tends to concentrate the distribution of loans by size. Moreover, if the ceiling becomes too restrictive and it does not allow the lender to cover its variable average costs, it will lead to the complete exclusion of certain borrower classes from the lender's portfolio, further limiting the access of marginal producers to formal credit and further concentrating the lender's credit portfolio in favor of a few priviledged producers.

Transaction costs and other forms of rationing

High transaction costs for both lenders and borrowers explain the limited access of agricultural producers to formal credit. When ceilings are imposed on interest rates, lenders may find themselves unable to cover these costs. In addition, due to a reduction in their scale of operations, these costs may be higher at the new levels of lending (11). In either case, lenders will tend to practice both non-price credit rationing and a restriction of the non-interest terms of the loan price. The latter, in turn, may shift some of the transaction costs from the lender to the borrowers. This behavior does not affect all borrower classes uniformly. Rather, it tends to restrict the access of marginal borrowers to credit more than proportionately, further contributing to a greater concentration of loan portfolios.

To set up a certain number of borrower classes, which would allow the lender to deal more efficiently with differential risks, it must acquire information about creditworthiness and use it in the determination of loan sizes. More information usually allows the lender to make better selection decisions and to obtain a corresponding reduction in losses due to default. Interest rate restrictions, however, may constrain the lender's profitable use of information. For a lender which operates with narrow margins, for example, the evaluation of mortgageable property may be the only risk-reducing activity which it can afford (28). When the allocation of loans becomes heavily influenced by the type of security offered, small producers with few assets to pledge are penalized and loan portfolios become concentrated in favor of the wealthier producers.

Moreover, the costs and returns to the lender from the use of information are a function of the degree of homogeneity among potential borrowers. Homogeneity allows the lender to set up a few borrower classes and reduces its transaction costs. In the rural areas of the Latin American countries, however, there is much heterogeneity among producers. This would require that, in order to maximize profits, lenders establish a large number of borrower classes. Interest rate restrictions, however, restrict the number of borrower classes that the lender can set up. In addition, when the lender is unable to include a given potential borrower in one of the established classes, it will not grant him a loan. If, due to the interest rate ceilings, a lender cannot afford the information required to classify a borrower in a given class, it will exclude him *ad portas* from its portfolio. As a consequence,

many potential borrowers which would have been otherwise supplied with loans, are thrown into a class of "non-borrowers", and excluded altogether from access to formal credit.

High costs of borrowing, on the other hand, restrict many demands for credit. The total costs of transactions for the borrower tend to be independent of loan size; average transactions costs, therefore, are a diminishing function of loan size. For example, the transportation and lodging costs involved in a trip to a town with a bank branch, as well as the opportunity cost of the producer's time spent in negotiating the loan, are independent of loan size. These costs, however, may be too high in the case of a small loan. This restricts the demand for credit in the case of smaller producers proportionately more than in the case of larger producers. Moreover, it has been shown that, particularly in the case of small loans, transactions costs are several times higher than the interest rate payments charged (2). A producer, therefore, would be willing to incur in these transactions costs, only if he expects to receive a loan large enough. When a lender practices non-price credit rationing, reducing loan sizes, it discourages many potential borrowers from applying for loans. In fact, many lenders believe that, in these circumstances, there is not a demand for credit. The fact is that there is a potential demand, in excess, that would not be satisfied by the lender. The borrower simply does not bother to manifest it. The smaller and marginal producers are more acutely affected by these reductions in loan size, voluntarily excluding themselves from the lender's loan portfolio.

When they are constrained by interest rate restrictions, the lenders will also tend to shift some transactions costs over to the borrowers. A profitable lender, for example, can afford to open many rural branches, thus absorbing the costs of getting borrowers and lender together. Because of economies of scale, these costs are lower in the case of the lender than as the summation of the costs of many borrowers for their trips to a distant branch. If a low interest rate ceiling is imposed, however, the rural branches will not be profitable. When the lender eliminates them, it shifts these transactions costs back to the borrowers. The latter may find that these costs are too high and may not demand formal credit any longer. The informal sources of credit would have acquired a comparative advantage over the institutional lender, despite the lower interest rate charged by the latter. The total cost of the loans from the informal lenders would be lower and the producers would prefer them.

The lender's objective function

The models of lender behavior discussed, in order to explain non-price credit rationing and the concentration of the portfolios of formal lenders, have been based on the assumption of profit maximization. Different lenders, however, may have different objective functions. Some of them are small private banks maximizing profits, but others are large bureaucratic banks attempting to maximize market shares. Some are public banks attempting to maximize political influence and others are institutions attempting to maximize staff expenditures, managerial emoluments or discretionary profits, under different sets of constraints. In general, all of them are trying to maximize a utility function in terms of their managers' set of preferences, through the pursuit of either profit maximizing or non-profit maximizing strategies (66). The actual impact of interest rate restrictions on their behavior obviously deperds on the nature of their objective functions.

For our purposes, however, formal lenders may be classified into two classes:

a. those whose objective function includes financial viability and institutional survival among the objectives pursued, and

b. those whose objective function does not include financial viability.

Among the second group of lenders we include one-shot pilot projects, credit programs interested in a small scale experiment, for a few years only, which are not interested in a permanent presence as a lender. We also include in this group agencies set up to temporarily disburse emergency or political grants, like a flood relief credit program. In the first group we include all lenders attempting to achieve all kinds of goals, provided that they do it under the constraint that they must remain financially viable.

To remain financially viable:

a. the lender must be able to preserve and hopefully increase its loan portfolio in real terms; i.e., it must preserve the same purchasing power of its loan portfolio; and

b. its revenues must cover a significant portion, if not all of the lender's costs.

A financially viable institution, therefore, must take into account its revenues and costs; i.e., it must have a profits strategy which guides the allocation of its portfolio among borrower classes. The models described in this paper are applicable to this class of institutions.

Some formal lenders may remain financially viable even if they do not possess a profits strategy, if they have continued access to funds from the Central Bank or from international agencies. However,

a. Some measure of profitability is frequently included in the evaluations of the performance of these lenders.

b. International agencies and fiscal sources may be willing to continue with their support only as long as the lender's losses are not too high. When these losses are substantial, even if the fiscal sources wanted to keep the financial viability of the formal lender, they may not possess sufficient resources to continue providing significant transfers to the lender.

c. While inflationary financing from the Central Bank can make large transfers in nominal terms possible, inflation erodes the real value of the lender's portfolio even more quickly.

d. Formal lenders will be able to receive large fiscal transfers only to the extent that they accept a political guidance with respect to credit allocation. These lenders, therefore, lose their independence in decision making and become mere disbursing agencies for other institutions: they become huge cashiers for other government offices.

e. When banking and economic criteria are replaced by political criteria for credit allocation, the rationing processes become more vulnerable to the influences of pressure groups and loan portfolios become even more concentrated.

f. The reluctance of politicians to take into account creditworthiness and their reluctance to enforce vigorous collection policies soon leads to high rates of default. Once many borrowers are not paying back, others will doubt that the institution will remain financially viable and will not pay back, either. Theirs becomes a self-fulfilling prophecy and, unless huge fiscal transfers are forthcoming, the institution will not survive. At the end, the formal lender is merely a costly and arbitrary mechanism for income redistribution. When the resources kept by the defaulters are added up to the implicit subsidies, huge amounts of resources would have been redistributed in favor of a few producers.

Conclusion

In Latin America, the interest rates that formal lenders can charge to agricultural producers have been constrained by ceilings that have kept them at low levels, usually below those of most other interest rates. Frequently, these constraints have been justified as a politically feasible and administratively manageable mechanism to redistribute income in favor of small producers. Despite these good intentions, however, these interest rate restrictions have actually harmed the small agricultural producers.

When credit is under-priced, a substantial subsidy is transferred to all borrowers, in direct proportion to the size of their loans. As a result, this direct impact of the ceilings is regressive: large borrowers receive large grants, small borrowers receive small grants. Non-borrowers, usually the smallest producers, receive no grants. The volume of these grants can become very substantial.

The interest rate ceilings have also an indirect impact on distribution, through their differential impact on access to credit. This differential impact is the consequence of the lender's rationing behavior in the presence of the excess demands for credit generated by the interest rate ceilings. Since the conventional model of interest rate ceilings cannot explain the distributive consequences of the ceilings, this paper has explored different models of non-price credit rationing and of rationing through the non-interest terms of the loan contract. In each case it has been shown how these rationing processes restrict the access of the smaller producers to formal credit and concentrate credit portfolios in favor of fewer larger borrowers.

In particular, according to the iron law of interest rate restrictions, as the ceilings become more restrictive, the size of the loans granted to non-rationed larger producers increases and the size of the loans granted to rationed smaller producers declines. This redistributes portfolios in favor of the larger borrowers. It can be claimed, therefore, that the interest rate ceilings enforced in most of the Latin American countries are among the important determinants of the limited access of agricultural producers to formal credit and of the high degree of concentration of the agricultural credit portfolios of formal lenders observed.

REFERENCES

1. Adams, Dale W., Davis, Harlan and Bettis, Lee. "Is inexpensive credit a bargain for small farmers ? The recent Brazilian experience." Inter-American Economic Affairs. Summer, 1972. pp. 47-58.

2. _____ and Nehman, Gerald I. "Borrowing costs and the demand for rural credit." The Journal of Development Studies. XV:2, January, 1979. pp. 165-176.

3. _____ and Graham, Douglas H. "A critique of traditional agricultural credit projects and policies." Economics and Sociology Occasional Paper No. 621. Department of Agricultural Economics and Rural Sociology. Columbus, Ohio: The Ohio State University. August, 1979.

4. Agency for International Development. A.I.D. Spring Review of Small Farmer Credit. Washington, D.C.: Department of State. 1973. 20 volumes.

5. Anderson, Paul S. and Ostas, James R. "Private credit rationing." New England Economic Review. May-June, 1977. pp. 24-37.

6. Avio, Kenneth L. "On the effects of statutory interest rate ceilings." The Journal of Finance. XXIX:5, December, 1974. pp. 1383-1395.

7. Akerlof, George A. "The market for "lemons": quality uncertainty and the market mechanism." Quarterly Journal of Economics. LXXXIV:3, August, 1970. pp. 488-500.

8. Araujo, Paulo F. Cidade de e Meyer, Richard L. "Politica de credito agricola no Brasil: objetivos e resultados." Ensaios sobre Politica Agricola Brasileira, Alberto Veiga, ed. Sao Paulo: Governo do Estado de Sao Paulo. Secretaria da Agricultura. 1979.

9. Baltensperger, Ernst. "Credit rationing. Issues and Questions." Journal of Money, Credit and Banking. X:2, May, 1978. pp. 170-183.

10. Barro, Robert J. "The loan market, collateral, and rates of interest." Journal of Money, Credit and Banking. VIII:4, November, 1976. pp. 439-456.

11. Benston, George J. "Rate ceiling implications of the cost structure of consumer finance companies." The Journal of Finance. XXXII:4, September, 1977. pp. 1169-1194.

12. Bhatt, V.V. "On financial innovations and development". Agricultural Credit and Rural Finance. Dale W. Adams, J.D. Von Pischke and Gordon Donald, eds. Johns Hopkins University Press. Forthcoming, 1981.

13. Bottomley, Anthony. "The costs of administering private loans in the underdeveloped rural areas." Oxford Economic Papers. XV:5, June, 1963. pp. 154-163.

14. _____ "The premium for risk as a determinant of interest rates in underdeveloped rural areas." Quarterly Journal of Economics. LXXVII:4, November, 1963. pp. 637-647.

15. _____ "The structure of interest rates in underdeveloped rural areas." Journal of Farm Economics. XLVI:2, May, 1964. pp. 313-322.

16. _____ "Monopoly profit as a determinant of interest rates in underdeveloped rural areas."Oxford Economic Papers. XVI:3, October, 1964. pp. 431-437.

17. _____ "Interest rate determination in underdeveloped rural areas." American Journal of Agricultural Economics. LXXVII:2, May, 1975. pp. 279-291.

18. Boulding, Kenneth E. "Equity and distribution. The interaction of markets and grants." Grants and Exchange. Martin Pfaff, ed. Amsterdam: North-Holland. 1976.

19. Brucker, Eric. "Usury legislation and market structure: an alternativa approach." The Journal of Finance. XXXII:4, September, 1977. pp. 1339-1347.

20. Chase, Sam B. Jr. "Credit risk and credit rationing: comment." Quarterly Journal of Economics. LXXV:2, May, 1961. pp. 319-327.

21. Donald, Gordon. Credit for Small Farmers in Developing Countries. Boulder: Westview Press. 1976.

22. Eckaus, Richard S. "Monopoly power, credit rationing and the variegation of financial structure." III Annual Meeting. Capital Markets Development Program. Washington, D.C.: Organization of American States. 1974.

23. Freimer, Marshall and Gordon, Myron J. "Why bankers ration credit." Quarterly Journal of Economics. LXXIX:3. August, 1965. pp. 397-416.

24. Fried, Joel and Howitt, Peter. "Credit rationing and implicit contract theory." Journal of Money, Credit and Banking. XII:3, August, 1980. pp. 471-487.

25. Gonzalez-Vega, Claudio. "Small Farmer Credit in Costa Rica: the Juntas Rurales." Small Farmer Credit in Costa Rica. Washington, D.C.: Agency for International Development. 1973.

26. _____ "Interest rate policies and small farmer credit programs in LDCs." Small Farmer Credit. Analytical Papers. Washington, D.C.: Agency for International Development. 1973.

27. _____"Economic growth and financial intermediation: comment." Money and Finance in Economic Growth and Development. Ronald I. McKinnon, ed. New York: Marcel Dekker. 1976.

28. _____ On the Iron Law of Interest Rate Restrictions. Agricultural Credit Policies in Costa Rica and in other Less Developed Countries. Ph. D. Dissertation. Stanford University. 1976.

29. _____"Interest rate restrictions and income distribution." American Journal of Agricultural Economics. LIX:5, December, 1977. pp. 973-976.

30. _____"Interest rate restrictions and the socially optimum allocation of credit." Savings and Development. IV:1, January, 1980. pp. 5-28.

31. _____"Arguments for interest rates reform." Agricultural Credit and Rural Finance. Dale W. Adams, J.D. Von Pischke and Gordon Donald, eds. Johns Hopkins University Press. Forthcoming, 1981.

32. _____"Las políticas de tasas de interes y la asignacion del credito agropecuario por las instituciones financieras de desarrollo de America Latina." Políticas de Tasas de Interes, Inflacion y Desarrollo de America Latina. Washington, D.C.: Banco Interamericano de Desarrollo. 1981.

33. Greer, Douglas F. "Rate ceilings, market structure, and the supply of finance company personal loans." The Journal of Finance. XXIX:5, December, 1974. pp. 1363-1382.

34. _____ "Rate ceilings and loan turndowns." The Journal of Finance. XXX:5, December, 1975. pp. 1376-1383.

35. Goudzwaard, Maurice B. "Price ceilings and credit rationing." The Journal of Finance. XXIII:1, March, 1968. pp. 177-19

36. _____ "Consumer credit charges and credit availability." The Southern Economic Journal. XXXV:3, January, 1969. pp. 214-230.

37. Harris, Duane G. "Credit rationing at commercial banks." Journal of Money, Credit and Banking. VI:2, May, 1974. pp. 227-240.

38. Hester, Donald D. "An empirical examination of a commercial bank loan offer function." Yale Economic Essays. II:1. Spring, 1962. pp. 2-57.

39. _____ and Pierce, James L. Bank Management and Portfolio Behavior. New Haven: Yale University Press. 1975.

40. Hodgman, Donald R. "Credit risk and credit rationing." Quarterly Journal of Economics. LXXIV:2, May, 1960. pp. 258-278.

41. _____ "The deposit relationship and commercial bank investment behavior." The Review of Economics and Statistics. XLIII:3, August, 1961. pp. 257-268.

42. _____ "Credit risk and credit rationing: reply." Quarterly Journal of Economics. LXXVI:3, August, 1962. pp. 488-493.

43. _____ Commercial Bank Loan and Investment Policy. Champaign: University of Illinois. 1963.

44. Jaffee, Dwight M. and Modigliani, Franco. "A theory and test of credit rationing." The American Economic Review. LIX:5, December, 1969. pp. 850-872.

45. _____ Credit Rationing and the Commercial Loan Market. New York: John Wiley and Sons. 1971.

46. _____ and Russell, Thomas. "Imperfect information, uncertainty, and credit rationing." Quarterly Journal of Economics. XC:4, November, 1976. pp. 651-666.

47. Kalay, Avner and Rabinovitch, Ramon. "On individual loans' pricing credit rationing and interest rate regulation." The Journal of Finance. XXXIII:4, September, 1978. pp. 1071-1085.

48. Kane, Edward J. "Good intentions and unintended evil: the case against selective credit allocation." Journal of Money, Credit and Banking. IX:1, February, 1977. pp. 55-69.

49. Kawaja, Michael. "The economic effects of regulation. A case study of the consumer finance industry." The Southern Economic Journal. XXXV:3, January, 1969. pp. 231-238.

50. Keeton, William R. Equilibrium Credit Rationing. New York: Garland Publishing. 1979.

51. Lindsay, Robert. The Economics of Interest Rate Ceilings. New York: New York University. Graduate School of Business Administration. 1970.

52. Lipton, Michael. "Agricultural risk, rural credit and the inefficiency of inequality." Risk, Uncertainty and Agricultural Development. James A. Roumasset, Jean Marc Boussard and Inderjit Singh, eds. New York: Agricultural Development Council.

53. Long, Millard F. "Interest rates and the structure of agricultural credit markets." Oxford Economic Papers. XX:2, July, 1968. pp. 275-288.

54. _____ "Why peasant farmers borrow." American Journal of Agricultural Economics. L:4, November, 1968. pp. 991-1008.

55. McKinnon, Ronald I. Money and Capital in Economic Development. Washington, D.C.: The Brookings Institution. 1973.

56. Miller, Merton H. "Credit risk and credit rationing: further comment." Quarterly Journal of Economics. LXXVI:3, August, 1962. pp. 480-487.

57. Meyer, Richard et al. "Rural capital markets and small farmers in Brazil." Small Farmer Credit in South America. Washington, D.C.: Agency for International Development. 1973.

58. Nathan, Harold C. "Economic analysis of usury laws." Journal of Bank Research. Winter, 1980. pp. 200-211.

59. Ostas, James R. and Zahn, Frank. "Interest and non-interest credit rationing in the mortgage market." Journal of Monetary Economics. I, 1975. pp. 187-201.

60. Rosen, Sherwin. "Hedonic prices and implicit markets: product differentiation in pure competition." Journal of Political Economy. LXXXII:1, January, 1974. pp. 34-55.

61. Ryder, Harl E. Jr. "Credit risk and credit rationing: comment." Quarterly Journal of Economics. LXXVI:3, August, 1962. pp. 471-493.

62. Samuelson, Paul A. Statement in "Monetary policy and the management of the public debt: hearings before the Subcommittee on General Credit Control and Debt Management." Joint Committee on the Economic Report. 82d Cong., 2d sess., 1952. p. 697.

63. Sayad, Joao. Credito Rural no Brasil. Brasilia: Fundaçao Instituto de Pesquisas Economicas. 1978.

64. Shaw, Edward S. Financial Deepening in Economic Development. New York: Oxford University Press. 1973.

65. Shay, Robert P. "Factors affecting price, volume and credit risk in the consumer finance industry." The Journal of Finance. XXV:2, May, 1970. pp. 503-515.

66. Shubik, Martin. "Objective functions and models of corporate optimization." Quarterly Journal of Economics. LXXV:3, August, 1961. pp. 345-375.

67. Shull, Bernard. "Commercial banks as multiple-product price-discriminating firms." Banking and Monetary Studies. D. Carson, ed. Homewood: Richard D. Irwin. 19 .

68. Smith, Paul F. "Pricing policies on consumer loans at commercial banks." The Journal of Finance. XXV:2, May, 1970. pp. 517-525.

69. Vogel, Robert C. and Gonzalez-Vega, Claudio. Agricultural Credit in Costa Rica. San Jose: Associated Colleges of the Midwest. 1969.

70. _____ "The effect of subsidized credit on the distribution of income in Costa Rica." Unpublished. Circa 1974.

71. _____ and Larson, Donald W. "Limitation of agricultural credit planning: the case of Colombia." Savings and Development. IV:1, January, 1980. pp. 52-62.

72. Wai, U Tun. "Interest rates outside the organized money markets of underdeveloped countries." Staff Papers. VI:1, November, 1957. pp. 80-142.

73. World Bank. Agricultural Credit. Sector Policy Papers. Washington, D.C. May, 1975.